

# PATENT ABSTRACTS OF JAPAN

(11)Publication number : 2003-198550

(43)Date of publication of application : 11.07.2003

(51)Int.Cl.

H04L 12/28 G06F 13/38

(21)Application number : 2001-392171

(71)Applicant : MATSUSHITA ELECTRIC IND CO LTD

(22)Date of filing : 25.12.2001

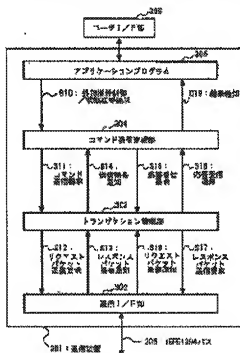
(72)Inventor : YAMAMURA TOSHIKI

## (54) COMMUNICATION DEVICE AND COMMUNICATION METHOD

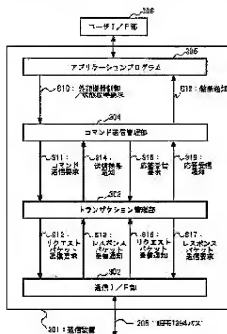
### (57)Abstract:

**PROBLEM TO BE SOLVED:** To provide a communication device and a communication method in which a result can be surely and rightly reported to an application program requesting a command transmission corresponding to a command response when that command response is received from external equipment.

**SOLUTION:** As for the command transmission request from an application program 305, a command transmission management part 304 refuses the reception of that command transmission request when there is possibility that the class of the command is different from that of a command accepting the command transmission request and the contents of the command responses are equal to each other.



# (54) COMMUNICATION DEVICE AND COMMUNICATION METHOD



## (57)Abstract:

**PROBLEM TO BE SOLVED:** To provide a communication device and a communication method in which a result can be surely and rightly reported to an application program requesting a command transmission corresponding to a command response when that command response is received from external equipment.

**SOLUTION:** As for the command transmission request from an application program 305, a command transmission management part 304

refuses the reception of that command transmission request when there is possibility that the class of the command is different from that of a command accepting the command transmission request and the contents of the command responses are equal to each other.

## CLAIMS

### [Claim(s)]

[Claim 1]An interface means for performing an external instrument and data communications, and a transaction management means to perform an external instrument and data communications via said interface means, A command transmission management tool which performs a command transmission demand to

said transaction management means, and receives command responses from said transaction management means, An application program which performs a command transmission demand to said command transmission management tool, and receives a result notice according to command responses from said command transmission management tool, \*\*\*\* and said command transmission management tool a judgment of whether to receive a command transmission demand from said application program A command of said command transmission demand, A communication apparatus characterized by what contents comparison with a command of a command transmission demand which is ending with a receptionist and has not yet received command responses from said transaction management means performs.

[Claim 2]An interface means for performing an external instrument and data communications, and a transaction management means to perform an external instrument and data communications via said interface means, A command transmission management tool which performs a command transmission demand to said transaction management means, and receives command responses from said transaction management means, An application program which performs a command transmission demand to said command transmission management tool, and receives a result notice according to command responses from said command transmission management tool, A command which it \*\*\*\* and said command transmission management tool receives a command transmission demand from said application program, and is ending and yet omits a command transmission demand to said transaction management means. (it is hereafter called "a waiting command for transmission".) -- a judgment of whether to carry out a Request to Send to said transaction management means with said waiting command for transmission. A communication apparatus characterized by what contents comparison with a command which is Request-to-Send ending and has not yet received command responses from a transaction management means to said transaction management means performs.

[Claim 3]The communication apparatus according to claim 1 or 2 characterized by

what it includes that it is performed based on existence of a possibility that the contents of command responses will become the same although a judgment by said contents comparison differs in both command types for.

[Claim 4]An interface means for performing an external instrument and data communications, and a transaction management means to perform an external instrument and data communications via said interface means, A command transmission management tool which performs a command transmission demand to said transaction management means, and receives command responses from said transaction management means, An application program which performs a command transmission demand to said command transmission management tool, and receives a result notice according to command responses from said command transmission management tool, A command which \*\*\*\*, and said command transmission management tool is ending with a command transmission demand to said transaction management means, and has not yet received command responses from a transaction management means. (it is hereafter called "a waiting command for a response".), when the contents of command responses to said two or more waiting commands for a response may become the same among them, A communication apparatus characterized by what command responses from said transaction management means are passed for to said application program after specified time elapse.

[Claim 5]The communication apparatus according to claim 4 after said predetermined time's receiving a sending completion notice to said last waiting command for a response from said transaction management means, wherein it is the time for 100 ms or more.

[Claim 6]When transmission destinations of a command of two or more command transmission demands differ, said command transmission management tool, Irrespective of existence of a possibility that the contents of command responses to both commands will become the same, A command transmission demand from said application program is received, The Request to Send of said waiting command for transmission is carried out to said transaction management means, Or the

communication apparatus according to claim 3 or 4 characterized by what a result notice according to command responses from said transaction management means is passed for to said application program without waiting for specified time elapse.

[Claim 7]A communication apparatus given in which claim of claim 1 to claim 6, wherein said interfacing means is an interface based on an IEEE1394 standard and said command is a command based on the AV/C digital interface command set.

[Claim 8]A correspondence procedure comprising:

A command transmission demand generation step in which an application program generates a command transmission demand.

A command of said command transmission demand.

A determination step which judges whether a command transmission demand from said application program is received by contents comparison with a command of a command transmission demand which is transmitting waiting or ending with transmitting, and has not yet received command responses.

A transmission step which transmits a command of said received command transmission demand.

[Claim 9]A correspondence procedure comprising:

A command transmission demand generation step in which an application program generates a command transmission demand.

A command of a command transmission demand which receives a command transmission demand from said application program, is ending and has not yet transmitted a command (it is hereafter called "a waiting command for transmission").

A determination step which judges whether said waiting command for transmission is transmitted, or it waits for transmission by contents comparison with a command of a command transmission demand which is ending with transmitting and has not yet received command responses.

A transmission step which transmits said waiting command for transmission judged that transmits.

[Claim 10]The correspondence procedure according to claim 8 or 9 characterized by what it includes that it is performed based on existence of a possibility that the contents of command responses will become the same although a judgment by said contents comparison differs in both command types for.

[Claim 11]A correspondence procedure comprising:

A transmission step which transmits a command.

A receiving step which starts processing of the contents of command responses after specified time elapse when the contents of command responses to two or more commands (it is hereafter called "a waiting command for a response".) which are ending with transmitting and have not yet received command responses may become the same.

[Claim 12]The correspondence procedure according to claim 11 after said predetermined time's receiving a sending completion notice to said last waiting command for a response, wherein it is the time for 100 ms or more.

[Claim 13]When transmission destinations of a command which was generated in said command transmission demand generation step, or was transmitted in a transmission step differ, Irrespective of existence of a possibility that the contents of command responses to both commands will become the same, The correspondence procedure according to claim 10 or 11 characterized by what processing of the contents of command responses is started for without receiving a command transmission demand from said application program, and transmitting said waiting command for transmission, or waiting for specified time elapse.

[Claim 14]A correspondence procedure given in which claim of claim 8 to claim 13, wherein said command is a command based on an AV/C digital interface command set of an IEEE1394 standard.

---

## DETAILED DESCRIPTION

---

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the communication apparatus and correspondence procedure which communicate among other electronic equipment connected with the communication control bus.

[0002]

[Description of the Prior Art] In recent years, audio video apparatus and electronic equipment, such as a personal computer (PC), are connected via a communication control bus like an IEEE1394 bus, for example, and a system which transmits data mutually is developed. The IEEE1394 bus used for such a system has the feature which can transmit video voice data, information data, and control commands by one cable. By this, for example Control machinery, such as PC, and CD (compact disk), Transmit and receive video voice data among electrical household appliances and electrical equipment (controlled instrument), such as MD (mini disc), HDD (hard disk drive), and DVD (digital videodisc), or, Control machinery (PC) becomes possible [ performing editing work, such as division, combination, elimination, rearrangement, etc. of motion control, such as reproduction, a stop, and search, or video voice data, to a controlled instrument ].

[0003] By thus, the case where I have you notify from a controlled instrument when the state of the present [ \*\*\*\* / that control machinery requires predetermined operation from a controlled instrument ] is acquired or change is from the present state on an IEEE1394 bus etc. As a command used especially for AV equipment, the AV/C command (general term of the command included in AV/C Digital Interface CommandSet) is specified.

[0004] As for transmission of the command on an IEEE1394 bus, an Asynchronous (asynchronous) transmission mode is used. Asynchronous transmission is a fundamental transmission mode in an IEEE1394 standard, and is a transmission mode which can check whether the partner has received normally by there being no time restrictions at the time of communication by an Ack (Acknowledge) packet.

Three, Write, Read, and Lock, are among the packets used by Asynchronous transmission.

[0005]Drawing 9 and drawing 10 are the figures showing the format of a Write packet. Drawing 9 is the format of a Write Request for Data Quadlet packet.

It uses, when the size of send data (Quadlet\_data of drawing 9) transmits 4 bytes (or less than it) of data.

Drawing 10 is the format of a Write Request for Data Block packet.

It uses, when the size of send data (Data\_field of drawing 10) transmits the data over 4 bytes.

[0006]By drawing 9 and drawing 10, the identifier (NodeID) of the data transfer point assigned on the IEEE1394 bus is set to DestinationID (2 bytes). tlabel (transaction label.) The number of a packet is set as 6 bits. rt (retry code.) The code which shows whether it is the packet resent [ whether it is the packet transmitted newly and ] is set as 2 bits. tcode (transaction code.) An instruction code is set as 4 bits. In the case of tcode=0, a Write Request for Data Quadlet packet is shown, and, in the case of tcode=1, a Write Request for Data Block packet is shown.

[0007]pri (priority.) The priority of a packet is set as 4 bits. The identifier (NodeID) of data transfer origin is set to SourceID (2 bytes). The address of a command register and a response register is set to Destination\_offset (6 bytes). The CRC (Cyclic Redundancy Check) computed value for the checksums of a header unit is set to Header\_CRC (4 bytes). A header unit is the 5th quadlet (1quadlet is 4 bytes.) from the head of each packet.

It is a basic unit of data processing in IEEE1394. Until is pointed out (it is got blocked and is a part for one packet about a Write Request for Data Quadlet packet). Quadlet\_data of drawing 9 and Data\_field of drawing 10 are data divisions which transmit.

The contents of the AV/C command are described.

[0008]By drawing 10, the data length of Data\_field is set to Data\_length (2 bytes).



Extended\_tcode (2 bytes) is used when tcode is extended. The CRC computed value for the checksums of a data division is set to Data\_CRC (4 bytes). Drawing 11 shows the format of Data\_field of the Write Request for Data Block packet at the time of AV/C command use. It is drawing 11 and is CTS (Command and Transaction Set.). Command set ID of this packet is shown and, in the case of an AV/C command, "0000" is set up. [ 4-bit ] In the case of command transmission, it is Ctype (Command type), and it sets the command type which transmits to Ctype/Response (4 bits). In the case of command responses, it is Response. The Response code which shows the processing result to this transmission command is set up.

The code table of Ctype and the Response code is shown in drawing 13.

[0009]The kind of electronic equipment of the address [ of a command ] or transmitting origin of a response (command responses) is set to Subunit\_type (5 bits). The table of Subunit\_type is shown in drawing 14. Here, in IEEE1394, when apparatus (for example, videocassette recorder etc.) themselves is shown, it is referred to as unit, and the formation parts (for example, tuner etc.) which this apparatus has are set to subunit. For example, as shown in drawing 15, when the address of a command is the videocassette recorder 1502, 0x1F (UNIT) is set as Subunit\_type, and, as for the case of the tuner subunit 1504, 0x05 (TUNER) is set up. Subunit\_ID is an identifier for identifying each, when two or more subunit(s) of an identical kind exist in unit. opcode (Operation Code.) 8 bits sets up the operation code which is the contents of the command, and operand0 to operandn (8 bits each) sets up the information which opcode needs.

[0010]Drawing 8 is a figure showing the outline of the general communication sequence by an AV/C command between the control machinery and the controlled instrument which were connected via the IEEE1394 bus. In the control machinery side, according to the control to a controlled instrument, first Ctype, The AV/C command which set up opcode and operand is created, In a WriteRequest for Data Quadlet packet (drawing 9) or a Write Request for Data Block packet (drawing 10), it transmits to a controlled instrument (S40). The Write response packet (Ack

packet) which shows whether the controlled instrument which received the AV/C command was received normally is transmitted to control machinery (S41). The format of a Write response packet is shown in drawing 12.

[0011]While a controlled instrument transmits a Write response packet, Analyze the AV/C command received by S40, and the command responses according to the command are created, It transmits to control machinery in the Write request packet (replace with Ctype, and it has the Response code, and also is the same format as S40) which set command responses to the data division (S42). The control machinery which received the Write request packet from a controlled instrument, The Write response packet (drawing 12) which shows whether the Write request packet was received normally is transmitted to a controlled instrument (S43), Response, opcode, and operand which were set to the data division are analyzed, and the response to the command which self transmitted is checked. Generally, the command transmission and command responses for control are made by the above communication sequence.

[0012]

[Problem(s) to be Solved by the Invention]However, as shown in drawing 16 for example, after control machinery transmits the command A (S50), When the command B is transmitted before receiving the command responses from the controlled instrument to the command A (S51), the problem which whether it is a response of as opposed to the command B for whether command-responses C (S52) from a controlled instrument is the response to the command A cannot identify may occur. In drawing 16, the graphic display of the Writeresponse packet to each Write request packet (a command or command responses) is omitted. The example which the above-mentioned problem generates is explained. Here, the contents of the command A and the command B are shown in drawing 17 (a), drawing 17 (b), and the following.

[Command A] (drawing 17 (a))

Ctype: 0x01 (STATUS (state inquiry))

opcode: 0xB2 (power supply)

operand [0] :0x7F (value of the operand in a power supply state inquiry)

[Command B] (drawing 17 (b))

Ctype: 0x02 (SPECIFIC INQUIRY (support check))

opcode: 0xB2 (power supply)

operand [0] :0x70 (support of a power supply on-control command)

[0013]The transmitting origin of transmitting origin [ of the commands A and B ] and command-responses C and D is the same control machinery, and the transmitting origin of the transmission destination of the commands A and B and command-responses C, and D is the same controlled instrument (Subunit\_type is 0x1F and Subunit\_ID is 0x03).

[0014]First, before control machinery transmits the command A (power supply state inquiry) to a controlled instrument and receives the command responses to the command A, it transmits the command B (support check of a power supply on-command) to a controlled instrument. After that, control machinery receives command-responses C of the contents shown in drawing 17 (c) from a controlled instrument (S52). Here, the pattern [ as opposed to / to drawing 20 / the command B for the pattern of command responses to the command A ] of command responses is shown to drawing 21. Supposing command-responses C is contents shown in drawing 19 (c), command-responses C from drawing 20 and drawing 21, It is not become final and conclusive at this time whether they are command responses (IMPLEMENTED) which report that the power supply on-command [ as opposed to the command B for whether they are command responses (STABLE) which notify the power supply ON state over the command A ] is supported.

[0015]Then, control machinery receives command-responses D of the contents shown in drawing 17 (d) from a controlled instrument (S52). Here, since operand [0] of command-responses D is "0x60", it is not the response to the command B (drawing 21). Therefore, it becomes clear that a response of as opposed to the command D (power supply OFF state) and the command B (support check of a power supply on-command) in the response to the command A (power supply state inquiry) is the command C (a power supply on-command is supported).

[0016] Since the command responses to the command which transmitted previously are not necessarily previously replied like this example when command types (Ctype) differ, When command-responses C was received and it is judged that the response (non-control machinery is a power supply ON state) to the command A was received, control to a controlled instrument may not be correctly performed by the mistaken command-responses interpretation.

[0017] Then, another example of a problem is explained. Drawing 18 is a communication sequence of this example of a problem. The graphic display of the Write response packet to each Write request packet (a command or command responses) is omitted like drawing 16. First, a self-opportunity (controller) transmits the command E (power supply state change notice requests) to the other opportunities 1 (controlled instrument) (S60). Subunit\_type of the other opportunities 1 is 0x1F (unit), and Subunit\_ID is 0x03. The contents of the command E are shown in drawing 19 (a) and the following.

[Command E] (drawing 19 (a))

Ctype: 0x03 (NOTIFY (change-of-state notice requests))

opcode: 0xB2 (power supply)

operand [0] :0x7F (value of the operand in power supply state change notice requests)

A self-opportunity receives the provisional response of the command E from the other opportunities 1 after command E transmission (S61). The contents of this provisional response are shown below.

[Command E provisional response]

Ctype: 0x0F (INTERIM (provisional response))

opcode: 0xB2 (power supply)

operand [0] :0x60 (it is a power supply OFF state now) or 0x70 (it is a power supply ON state now)

[0018] After that, command F (power supply state inquiry) transmission of a self-opportunity is done to the other opportunities 1. The contents of the command F are shown in drawing 19 (b) and the following.

[Command F] (drawing 19 (b))

Ctype:0x01 (STATUS (state inquiry))

opcode: 0xB2 (power supply)

operand[0]:0x7F (value of the operand in a power supply state inquiry)

After that, a self-opportunity receives command-responses H of the contents shown in drawing 19 (c) from the other opportunities 1 (S64). Here, the pattern of command responses to the command E is shown to drawing 22. The pattern of command responses to the command F is the same (drawing 20) with the above-mentioned command A. Supposing command-responses H is contents shown in drawing 19 (c), command-responses H from drawing 22 and drawing 20, It is not become final and conclusive at this time whether they are command responses (REJECTED) which notify command refusal of as opposed to the command F for whether they are the last (REJECTED) command responses that notify the command refusal to the command E.

[0019]Although only one can process a change-of-state notice-requests command, the other opportunities 1 such a thing, It has a control facility and also transmitting the notice of command refusal (REJECTED) from the machine 2 to the change-of-state notice-requests command E which has already received the command G which is a change-of-state notice-requests command for reception (S63) to write occurs owing to.

[0020]After that, a self-opportunity receives command-responses I of the contents shown in drawing 19 (d) from the other opportunities 1 (S66). Here, since Response of command-responses I is "0x0C", it is not the response to the command E (drawing 22). Therefore, it becomes clear that a response of as opposed to the command H (command rejected note) and the command F (power supply state inquiry) in the response to the command E (power supply state change notice requests) is the command I (power supply ON state). However, when the self-opportunity which does not get to know about the command G received command-responses H and it is judged that the response (command rejected note) to the command F was received, the command-responses interpretation mistaken

to the transmission command will be carried out.

[0021]Although danger like two above-mentioned examples differs in Ctype (command type), It originates in that a command-responses format may be the same, and especially control machinery has comparatively high performance, and danger becomes high with the control machinery which can transmit another command to the same controlled instrument without waiting for the command responses from the controlled instrument to the command whose number is one. In order to prevent this, when a command is transmitted to the specific partner point, there is a method of not transmitting the command of the same opcode to the same partner point (NodeID, Subunit\_type, and Subunit\_ID are in agreement.) until it receives command responses.

[0022]However, in such a case, the technical problem that command transmission will be restricted superfluously occurs. Since it does not understand when the last response comes on the contrary when a change-of-state notice-requests command is transmitted, the technical problem that the following command cannot be transmitted occurs. In view of an aforementioned problem, an object of this invention is to provide the communication apparatus and correspondence procedure which can perform more positive communications control in the transmission and reception of a command using an AV/C command.

[0023]

[Means for Solving the Problem]In order to solve an aforementioned problem, a communication apparatus and a correspondence procedure of this invention have the following composition. An interface means for the invention according to claim 1 to perform an external instrument and data communications, A transaction management means to perform an external instrument and data communications via said interface means, A command transmission management tool which performs a command transmission demand to said transaction management means, and receives command responses from said transaction management means, An application program which performs a command transmission demand to said command transmission management tool, and receives a result notice according to

command responses from said command transmission management tool, \*\*\*\* and said command transmission management tool a judgment of whether to receive a command transmission demand from said application program A command of said command transmission demand, It is ending with a receptionist and is a communication apparatus characterized by what contents comparison with a command of a command transmission demand which has not yet received command responses from said transaction management means performs.

[0024]An interface means for the invention according to claim 2 to perform an external instrument and data communications, A transaction management means to perform an external instrument and data communications via said interface means, A command transmission management tool which performs a command transmission demand to said transaction management means, and receives command responses from said transaction management means, An application program which performs a command transmission demand to said command transmission management tool, and receives a result notice according to command responses from said command transmission management tool, A command which it \*\*\*\* and said command transmission management tool receives a command transmission demand from said application program, and is ending and yet omits a command transmission demand to said transaction management means. (it is hereafter called "a waiting command for transmission".) -- a judgment of whether to carry out a Request to Send to said transaction management means with said waiting command for transmission. It is a communication apparatus characterized by what contents comparison with a command which is Request-to-Send ending and has not yet received command responses from a transaction management means to said transaction management means performs.

[0025]The invention according to claim 3 is the communication apparatus according to claim 1 or 2 with which a judgment by said contents comparison is characterized by what it includes that the contents of command responses are performed based on existence of a possibility of becoming the same although both command types differ for.

[0026]An interface means for the invention according to claim 4 to perform an external instrument and data communications, A transaction management means to perform an external instrument and data communications via said interface means, A command transmission management tool which performs a command transmission demand to said transaction management means, and receives command responses from said transaction management means, An application program which performs a command transmission demand to said command transmission management tool, and receives a result notice according to command responses from said command transmission management tool, A command which \*\*\*\*, and said command transmission management tool is ending with a command transmission demand to said transaction management means, and has not yet received command responses from a transaction management means. (it is hereafter called "a waiting command for a response".), when the contents of command responses to said two or more waiting commands for a response may become the same among them, It is a communication apparatus characterized by what command responses from said transaction management means are passed for to said application program after specified time elapse.

[0027]The invention according to claim 5 is the communication apparatus according to claim 4 after said predetermined time's receiving a sending completion notice to said last waiting command for a response from said transaction management means, wherein it is the time for 100 ms or more.

[0028]The invention according to claim 6 said command transmission management tool, When transmission destinations of a command of two or more command transmission demands differ, Irrespective of existence of a possibility that the contents of command responses to both commands will become the same, A command transmission demand from said application program is received, The Request to Send of said waiting command for transmission is carried out to said transaction management means, Or it is the communication apparatus according to claim 3 or 4 characterized by what a result notice according to command responses from said transaction management means is passed for to said application program



without waiting for specified time elapse.

[0029]The invention according to claim 7 is the interface with which said interfacing means was based on an IEEE1394 standard, Said command is a communication apparatus given in which claim of claim 1 to claim 6 being a command based on the AV/C digital interface command set.

[0030]A command transmission demand generation step in which an application program generates a command transmission demand in the invention according to claim 8, By contents comparison with a command of said command transmission demand, and a command of a command transmission demand which is transmitting waiting or ending with transmitting, and has not yet received command responses. It is a correspondence procedure having a determination step which judges whether a command transmission demand from said application program is received, and a transmission step which transmits a command of said received command transmission demand.

[0031]A command transmission demand generation step in which an application program generates a command transmission demand in the invention according to claim 9, A command (it is hereafter called "a waiting command for transmission".) of a command transmission demand which receives a command transmission demand from said application program, is ending and has not yet transmitted a command, By contents comparison with a command of a command transmission demand which is ending with transmitting and has not yet received command responses. It is a correspondence procedure having a determination step which judges whether said waiting command for transmission is transmitted, or it waits for transmission, and a transmission step which transmits said waiting command for transmission judged that transmits.

[0032]It is the correspondence procedure according to claim 8 or 9 characterized by what it includes that the invention according to claim 10 is performed based on existence of a possibility that it will become the same [ the contents of command responses ] although a judgment by said contents comparison differs in both command types for.

[0033]Two or more commands which the inventions according to claim 11 are a transmission step which transmits a command, and ending with transmitting, and have not yet received command responses. (it is hereafter called "a waiting command for a response".) -- when the contents of receiving command responses may become the same, it is a correspondence procedure having a receiving step which starts processing of the contents of command responses after specified time elapse.

[0034]The invention according to claim 12 is the correspondence procedure according to claim 11 after said predetermined time's receiving a sending completion notice to said last waiting command for a response, wherein it is the time for 100 ms or more.

[0035]When transmission destinations of a command which was generated in said command transmission demand generation step, or was transmitted in a transmission step differ, the invention according to claim 13, Irrespective of existence of a possibility that the contents of command responses to both commands will become the same, It is the correspondence procedure according to claim 10 or 11 characterized by what processing of the contents of command responses is started for without receiving a command transmission demand from said application program, and transmitting said waiting command for transmission, or waiting for specified time elapse.

[0036]The invention according to claim 14 is a correspondence procedure given in which claim of claim 8 to claim 13, wherein said command is a command based on an AV/C digital interface command set of an IEEE1394 standard.

[0037]This invention has the operation that a right result notice can be performed certainly, to an application program which performed a command transmission demand corresponding to the command responses at the time of command-responses reception.

[0038]

[Embodiment of the Invention]It explains referring to drawings for the example which showed the suitable gestalt for carrying out this invention concretely below.

[0039]<<Example 1>> The communication apparatus and correspondence procedure of Example 1 are explained using drawing 1 - drawing 5. It is suitably referred to also for the drawing used by explanation by "PRIOR ART" and "Object of the Invention." Drawing 2 is a schematic diagram showing the composition of the communications system of Example 1. As for a unit and 203, in drawing 2, 201 is [ the subunit B and 205 ] IEEE1394 buses the subunit A and 204 a controller and 202. The controllers 201 are initiators, such as PC which controls the unit 202, the subunit A203, and the subunit B204, and have a communication apparatus of this invention. The units 202 are apparatus (target), such as a videocassette recorder, and are controlled by transmission and reception of the command from the controller 201. The subunit A203 and the subunit B204 are function parts which the unit 202 has. When the unit 202 is used as a videocassette recorder, specifically, it is equivalent to a tuner, a video cassette recorder/player, etc. The subunit A203 and the subunit B204 as well as the unit 202 are controlled by transmission and reception of the command from the controller 201.

[0040]The internal configuration of the controller 201 is shown in drawing 3. In drawing 3, 301 is a communication apparatus and 306 is a user I/F part. The communication apparatus 301 is provided with the following.

The communication I/F part 302 which constitutes a hardware layer.

The transaction management department 303, the command transmission Management Department 304, the application program 305 which constitute a software layer.

The conventional communication apparatus had the communication I/F part 302, the transaction management department 303, and the application program 305. The communication apparatus of this invention is characterized by having the command transmission Management Department 304 further. The communication I/F part 302 is interface hardware which performs the data communications by the external instrument (unit 202) and an AV/C command. The communication I/F part 302 changes a request packet into an electrical signal in response to the request packet (Writerequest packet) Request to Send from the transaction management

department 303, When it sends out to IEEE1394 bus 205 and the request packet (Write request packet) from an external instrument is received, request packet reception is notified to the transaction management department 303.

[0041]The transaction management department 303 creates a Write Request packet by the command transmission demand from the command transmission Management Department 304, When a request packet (Write request packet) is received from an external instrument, a response packet (Write response packet) is created, and each Request to Send is advanced to the communication I/F part 302. Analysis of the request packet from an external instrument and a response packet which the communication I/F part 302 received is conducted. The command transmission Management Department 304 is located between the application program 305 and the transaction management department 303, The demand from the application program 305 performs a command transmission demand to the transaction management department 303, And command responses are received from the transaction management department 303, and the result of having responded to the application program 305 at the contents of the command responses is notified. The details of the command transmission Management Department 304 are explained later. The application program 305 receives the command transmission Management Department 304, The command transmission Management Department 304 is notified of the control / state acquisition / change-of-state notice requests, etc. to an external instrument, and the result notice (command responses) according to the contents of command responses is received from the command transmission Management Department 304.

[0042]The user I/F part 306 performs the output of the result, when a request packet is received from the input of instructions, such as appliance control according to the dubbing control and the request to print out files by a user, and an external instrument.

[0043]Next, order is explained later on about operation of command transmission and reception. The application program 305 controls the unit 202, the subunit A203, or the subunit B204, When performing a support check, a state inquiry,

change-of-state notice requests, etc., the control / state acquisition / change-of-state notice requests, etc. to a controlled instrument are first required of the command transmission Management Department 304 (S10). The command transmission Management Department 304 which received it notifies the application program 305 whether the demand was received normally or reception was refused. When a demand is received normally, the command transmission Management Department 304 creates an AV/C command frame, and performs a command transmission demand to the transaction management department 303 to predetermined timing (S11).

[0044]The transaction management department 303 which received the command transmission demand notifies the command transmission Management Department 304 of whether the demand was received normally or the receptionist was refused. When a demand is received normally, the transaction management department 303, From the command transmission Management Department 304, create the request packet (Write Request packet (drawing 9 or drawing 10)) which set the received AV/C command frame to the data division, and to predetermined timing. A request packet Request to Send is advanced to the communication I/F part 302 (S12). The communication I/F part 302 which received the request packet Request to Send transmits a request packet to the specified partner point (external instrument).

[0045]The communication I/F part 302 will perform response packet advice of receipt in the transaction management department 303, if the response packet (Write response packet (drawing 12)) which received from the partner point which carried out command transmission is received (S13). The transaction management department 303 which received response packet advice of receipt analyzes a response packet, and checks whether the partner point has received normally the request packet which transmitted previously. The transaction management department 303 notifies the command transmission Management Department 304 of the result (S14). The command transmission Management Department 304 advances the response request to receipt of the request packet to which command responses were set to the transaction management department 303, when it is

judged by the transmission result from the transaction management department 303 that the partner point received the command normally (S15). The communication I/F part's 302 reception of the request packet to which command responses were set from the partner point will take out request packet advice of receipt to the transaction management department 303 (S16).

[0046]The transaction management department 303 analyzes the request packet which received, creates a response packet, and advances a response packet Request to Send to the communication I/F part 302 (S17). The communication I/F part 302 which received the response packet Request to Send transmits a response packet to the specified partner point (external instrument). When it is judged that the transaction management department 303 has the normal request packet which received, command-responses advice of receipt is taken out to the command transmission Management Department 304 (S18). From the transaction management department 303, the command transmission Management Department 304 which received the notice of command responses analyzes the command responses set to the data division of a request packet, and notifies a result to the application program 305 (S19). The application program 305 notifies a user of the result via the user I/F part 306, or shifts to the next control action from the result.

[0047]Here, the function of the command transmission Management Department 304 is explained. The command transmission Management Department 304 can receive the demand of the control / state acquisition / change-of-state notice requests, etc. to the controlled instrument from two or more application programs 305, and the received demand command is managed with a transmission command management table. Drawing 4 is a figure showing an example of a transmission command management table. As shown in drawing 4, the information registered into a transmission command management table, The application classification which carried out the Request to Send and which was demanded for every command, the processing state of a command (waiting for transmission / response waiting), It is the partner point (NodeID, Subunit\_type, Subunit\_ID), command type (Ctype), and command code/parameter (opcode, operand [0] - operand [n]) of

command transmission.

[0048]In the processing state of a command, although "the waiting for transmission" is receiving the command transmission demand from the application program 305, it is still in the state of omitting the command transmission demand to the transaction management department 303. Although "the waiting for a response" performed the command transmission demand to the transaction management department 303, it is still in the state where command responses are not received from the transaction management department 303. Hereafter, "the waiting command for transmission" and the command of a "waiting for response" state are called "the waiting command for a response" for the command of a "waiting for transmission" state by the command registered into the transmission command management table.

[0049]Next, when the demand of the control / state acquisition / change-of-state notice requests, etc. to a controlled instrument is newly received from the application program 305, the demand reception decision processing which the command transmission Management Department 304 performs is explained. Drawing 1 is a flow chart which shows the algorithm of this demand reception decision processing of operation. In Step S101, demand existence, such as control / state acquisition / change-of-state notice requests, etc. to a controlled instrument, is judged from the application program 305. When there is a demand, it shifts to Step S102, and when there is no demand, it escapes from this processing. In Step S102, the AV/C command frame equivalent to a demand is created. In Step S103, the command (registered command) which is registered into the transmission command management table shown in drawing 4 and which has already received the Request to Send is compared with the created command frame, and it is judged whether the transmission partner point is the same. When the transmission partner point is the same, it shifts to Step S104, and when the transmission partner point is not the same, it shifts to Step S107.

[0050]In Step S104, a registered command is compared with the created command frame, and Ctype, opcode (OPC), and operand (OPR) perform that same judgment. When Ctype, OPC, and OPR are the same (the same command), it shifts to Step

S106, and when not the same, it shifts to Step S105.

[0051]In Step S105, the transmission command classification (Ctype) of the created command frame differs from a registered command, and it is judged whether the command-responses frame may become the same. Here, the check of whether a command-responses frame becomes the same is performed using the command (there is \*\*\*\* which becomes the same [ a command-responses frame ]) combination management table currently prepared beforehand. Drawing 5 is a figure showing an example of a command combination management table. As shown in drawing 5, a command combination management table, A certain transmission command information (a command type (Ctype), and command code/parameter ()) [ opcode and ] It is the table which has registered the combination of the command information which may become operand [0] - operand [n] differ from a command type, and the same [ a command-responses frame ] for every set. The judgment of whether a command-responses frame becomes the same is performed with the combination of the command information of a registered command and the command information of the created command frame confirming whether register with this command combination management table. When the transmission command classification of the created command frame may differ from a registered command and the command-responses frame may become the same, it shifts to Step S106, and when that is not right, it shifts to Step S107.

[0052]A command reception improper notice is taken out with Step S106 to the application program 305, and it escapes from processing at it. In Step S107, it is distinguished whether comparison with the created command frame and all the registered commands of a transmission command management table was completed. When comparison with all the registered commands is completed, it shifts to Step S108, and when no comparison with registered commands is completed, a comparison object is shifted to the following registered command, and it returns to Step S103. The created command frame is added to a transmission command management table, a command reception completion notification is taken out with Step S108 to the application program 305, and it escapes from this



processing. The command transmission Management Department 304 performs a command transmission demand to the transaction management department 303 about the command frame of the received command transmission demand one by one.

[0053]As mentioned above, in the communication apparatus and correspondence procedure of Example 1, When there is a new command transmission demand from the application program 305, the command transmission Management Department 304, This command is compared with the command which have been registered into the transmission command management table and which already received the command transmission demand, and when the contents of both command responses may become the same, reception of a command transmission demand is refused. Therefore, transmission of the period of the command which may carry out the result notice mistaken to the application program 305 can be prevented at the time of command-responses reception.

[0054]<<Example 2>> The communication apparatus and correspondence procedure of Example 2 are explained using drawing 6. It is suitably referred to also for the drawing used by explanation in "PRIOR ART", "Object of the Invention", and Example 1. The composition of the communications system of Example 2 and a communication apparatus is the same as the composition (drawing 3) of the communications system (drawing 2) of Example 1, and the communication apparatus 301. The function of the command transmission Management Department 304 of the communication apparatus 301 differs from the communication apparatus 301 of Example 1. Since other functions are the same, only the point of difference is explained here. Although the command transmission Management Department 304 of the communication apparatus 301 of Example 1 was characterized by the reception decision processing to the demand of the control / state acquisition / change-of-state notice requests, etc. to the external instrument from the application program 305, The command transmission Management Department 304 of the communication apparatus 301 of Example 2 receives all demands of the control / state acquisition / change-of-state notice

requests, etc. to the controlled instrument (external instrument) from the application program 305 (with no reception judging). The command transmission Management Department 304 has the feature in the processing which notifies the command which received the demand to the transaction management department 303 (S11 of drawing 3). A transmission command management table (drawing 4) and a command combination management table (drawing 5) are held and used like the command transmission Management Department 304 of the communication apparatus 301 of Example 1.

[0055]Drawing 6 is a flow chart which shows the algorithm of the command transmission request process to the transaction management department 303 of the command transmission Management Department 304 of operation. In Step S601, the command transmission Management Department 304 judges whether the command of a transmitting waiting state exists in a transmission command management table in the state which can be command transmission demanded to the transaction management department 303. When a Request-to-Send possible state and the waiting command for transmission exist, it shifts to Step S602. When that is not right, it escapes from this processing. In Step S602, the waiting command for transmission registered into the transmission command management table shown in drawing 4 is compared with the transmitted command (waiting command for a response) already similarly registered into the transmission command management table, and it is judged whether the transmission partner point is the same. When the transmission partner point is the same, it shifts to Step S603, and when the transmission partner point is not the same, it shifts to Step S607. Here, let the waiting command for transmission which becomes a comparing agency be the oldest command in the waiting command for transmission registered into the transmission command management table at first-time Step S602 after this processing start.

[0056]In Step S603, the waiting command for transmission is compared with the waiting command for a response, and it is judged whether CType, opcode (OPC), and operand (OPR) are the same. When CType, OPC, and OPR are the same (the

same command), it shifts to Step S605, and when not the same, it shifts to Step S604. In Step S604, the transmission command classification (Ctype) of the waiting command for transmission and the waiting command for a response differs, and it is judged whether the command-responses frame may become the same. Here, the check of whether a command-responses frame becomes the same is performed using a command (there is \*\*\*\* which becomes the same [ a command-responses frame ]) combination management table, as Example 1 explained. When the transmission command classification of the waiting command for transmission and the waiting command for a response may differ and the command-responses frame may become the same, it shifts to Step S605, and when that is not right, it shifts to Step S607.

[0057]In Step S605, it is investigated whether the waiting command for transmission registered into the transmission command management table exists else. When it exists, the waiting command for transmission is made into a processing object, and it returns to Step S602. When it does not exist, it shifts to Step S606. Let turn of searching the following waiting command for transmission be the order of registration (old). In Step S606, it is investigated whether the command responses to the waiting command for a response (any of the inside registered into the transmission command management table are they?) were received. When it receives, the waiting command for transmission used as a processing object is made into the first waiting command for transmission (the oldest), and it returns to Step S602.

[0058]In Step S607, it is distinguished whether comparison with the waiting command for transmission and all the waiting commands for a response of a transmission command management table was completed. When comparison with all the waiting commands for a response is completed, it shifts to Step S608, and when not having ended, a comparison object is made into the following waiting command for a response, and it returns to Step S602. In Step S608, a command transmission demand of this waiting command for transmission is notified to the transaction management department 303. The information on this waiting command

for transmission of a transmission command management table is changed (a state is changed into "the waiting for a response"), and it escapes from this processing.

[0059]As mentioned above, in the communication apparatus and correspondence procedure of Example 2, The command transmission Management Department 304 compares the waiting command for transmission by which transmission command management table registration is carried out with the waiting command for a response by which transmission command management table registration is similarly carried out, When both command responses may become the same, the Request to Send of this waiting command for transmission is not performed, but command responses wait to receive the command responses to the waiting command for a response which may become the same. After receiving the command responses to the waiting command for a response (after the waiting command for a response which may become the same [ command responses ] is lost), the Request to Send of this waiting command for transmission is performed in the transaction management department 303. Therefore, transmission of the period of the command which may carry out the result notice mistaken to the application program 305 can be prevented at the time of command-responses reception.

[0060]<<Example 3>> The communication apparatus and correspondence procedure of Example 3 are explained using drawing 7. It is suitably referred to also for the drawing used by explanation in "PRIOR ART", "Object of the Invention", Example 1, and Example 2. The composition of the communications system of Example 3 and a communication apparatus is the same as the composition (drawing 3) of the communications system (drawing 2) of Example 1, and the communication apparatus 301. The function of the command transmission Management Department 304 of the communication apparatus 301 differs from the communication apparatus 301 of Example 1 and Example 2. Since other functions are the same, only the point of difference is explained here. The command transmission Management Department 304 of the communication apparatus 301 of Example 3, All demands of the control / state acquisition / change-of-state notice requests, etc. to the controlled instrument (external instrument) from the application

program 305 are received (with no reception judging), and the received command is notified to the transaction management department 303 (with no Request-to-Send judging). When the command-responses advice of receipt from the transaction management department 303 is received, the command transmission Management Department 304 (S18 of drawing 3), The command is transmitted to an external instrument, and out of the command (waiting command for a response) to which a response has not been returning yet, the waiting command for a response corresponding to these command responses is chosen, and it has the feature in the processing which notifies the result to the application program 305 (S19 of drawing 3). A transmission command management table (drawing 4) is held and used like the command transmission Management Department 304 of the communication apparatus 301 of Example 1.

[0061]Drawing 7 is a flow chart which shows the algorithm of the result notice processing to the application program 305 of the command transmission Management Department 304 of operation. In Step S701, it is judged whether there was any command-responses advice of receipt from the transaction management department 303. When there is command-responses advice of receipt, it shifts to Step S702, and when there is nothing, it escapes from this processing. The transmitting origin (transmission destination of the waiting command for a response) of the command responses received from the transmission command management table in Step S702 is the same, Transmission command classification (Ctype) differs and it is investigated [ the received command responses and ] whether two or more waiting commands for a response which may become the same [ the command-responses frame ] exist. When more than one exist, it shifts to Step S703, and when more than one do not exist, it shifts to Step S706.

[0062]As opposed to a command transmission demand (S11 of drawing 3) just before carrying out from the command transmission Management Department 304 to the transaction management department 303 in Step S703, After receiving the transmission result notice (S14 of drawing 3) from the transaction management department 303, it is judged whether 100 ms passed. When 100 ms has passed, it

shifts to Step S704, and when 100 ms has not passed, Step S703 is repeated. In Step S704, it is judged whether another command-responses advice of receipt was among 100 ms after a transmission result notice from the transaction management department 303. When there is command-responses advice of receipt, it shifts to Step S705, and when there is nothing, it shifts to Step S706.

[0063]In the communication using an AV/C command, transmission of the command responses (Write request packet) to a demand command (Write request packet), Carrying out within 100 ms is specified after response packet (Write response packet) transmission. Therefore, when shown in drawing 18, by the response waiting state of two or more commands (the command E, the command F). When command responses are received (command H), while standing by for 100 ms from the time of the response packet reception to the command F, the case where command-responses I is not received -- (in Step S704, it branches to No.) -- command-responses H, the last response (notice when a state changes) to the command E (change-of-state notice requests) has not been received yet to the command F (state inquiry) -- it can judge (the state is not yet changing).

[0064]In Step S705, the contents of the command responses received first and the command responses received next are analyzed, and the waiting command for a response corresponding to each is judged. This waiting command for a response is deleted from a transmission command management table. Here, the method of making two or more received commands and two or more waiting commands for a response matching is performed by the method indicated by "Object of the Invention." When it explains using drawing 18, again command-responses H, Range which a command-responses format of as opposed to a command in saying [ that correspond to the command E and command-responses I corresponds to the command F ] can take (as shown in drawing 22, to the command E) What (elimination is used) is judged from the format of command-responses I not returning is possible. In Step S706, a result notice is performed to the application program 305, and it escapes from this processing.

[0065]As mentioned above, in the communication apparatus and correspondence

procedure of Example 3, When command-responses advice of receipt is received from the transaction management department 303, in the waiting command for a response of a transmission command management table, When two or more things from which the command responses may become the same as that of the this received command responses exist, The command transmission Management Department 304 performs the result notice corresponding to the command responses this received from the transaction management department 303 to the application program 305 after 100-ms progress after receiving the command transmission result notice corresponding to the last Request to Send. When new command-responses advice of receipt is received from the transaction management department 303 in the meantime (100 ms), the contents of two command responses are analyzed and it is made to compare with the waiting command for a response of a transmission command management table. Therefore, a right result notice can be certainly performed to the application program 305.

[0066]

[Effect of the Invention]As mentioned above, according to the communication apparatus and correspondence procedure of this invention, although the command transmission Management Department differs in a command type, By performing command reception / Request to Send / notice judging based on the existence of a possibility that the contents of command responses will become the same, The right result notice which certainly corresponds to an application program at the time of those command-responses reception can be performed to the transmission command demand from two or more application programs which receives the same partner point (external instrument) connected outside. Therefore, malfunction/misregistration of the application program which considers the mistaken result notice as a reason can be prevented, and the command transmission restrictions to the same external instrument can be eased more. When the transmission destinations of the command differ or the contents of command responses cannot become the same, a command can be transmitted promptly and the received command responses can be processed.

---

## DESCRIPTION OF DRAWINGS

---

### [Brief Description of the Drawings]

[Drawing 1] In Example 1 of this invention, it is a flow chart which shows the algorithm of demand reception decision processing of operation.

[Drawing 2] It is a schematic diagram showing the composition of the communications system in the example of this invention.

[Drawing 3] In the example of this invention, it is a block diagram showing the composition of the communication apparatus 301.

[Drawing 4] In the example of this invention, it is a figure showing an example of a transmission command management table.

[Drawing 5] In the example of this invention, it is a figure showing an example of a command combination management table.

[Drawing 6] In Example 2 of this invention, it is a flow chart which shows the algorithm of the command transmission request process to the transaction management department 303 of operation.

[Drawing 7] In Example 3 of this invention, it is a flow chart which shows the algorithm of the result notice processing to the application program 305 of operation.

[Drawing 8] It is a figure showing the outline of the communication sequence by an AV/C command between control machinery and a controlled instrument.

[Drawing 9] It is a figure showing the format of a Write Request for Data Quadlet packet.

[Drawing 10] It is a figure showing the format of a Write Request for Data Block packet.

[Drawing 11] It is a figure showing the format of data\_field of the Write Request for Data Block packet at the time of AV/C command use.

[Drawing 12] It is a figure showing the format of a Write response packet.

[Drawing 13] It is a code table of a command type and command-responses



classification.

[Drawing 14] It is a table of Subunit\_type.

[Drawing 15] It is a figure showing an example of apparatus connection using an IEEE1394 bus.

[Drawing 16] It is the same and also is a figure showing two or more cases where command transmission is carried out in a machine.

[Drawing 17] It is a figure showing the setting detail of each command in drawing 16.

[Drawing 18] It is the same and also is a figure showing another example in two or more cases of carrying out command transmission in a machine.

[Drawing 19] It is a figure showing the setting detail of each command in drawing 18.

[Drawing 20] It is a figure showing the pattern of command responses to a "power supply state inquiry" command.

[Drawing 21] It is a figure showing the pattern of command responses to a "support check of power supply on-command" command.

[Drawing 22] It is a figure showing the pattern of command responses to a "power supply state change notice-requests" command.

[Description of Notations]

201 Controller

202 Unit

203 Subunit A

204 Subunit B

205 IEEE1394 bus

301 Communication apparatus

302 Communication I/F part

303 Transaction management department

304 Command transmission Management Department

305 Application program

306 User I/F part

1501 Video camcorder

1502 Videocassette recorder

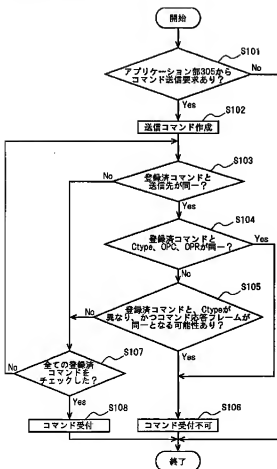
1503 and 1505 Videotape subunit

1504 Tuner subunit

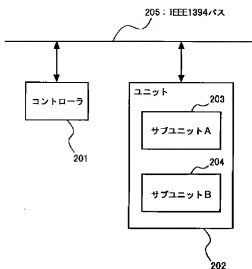
1506 Video camera subunit

## DRAWINGS

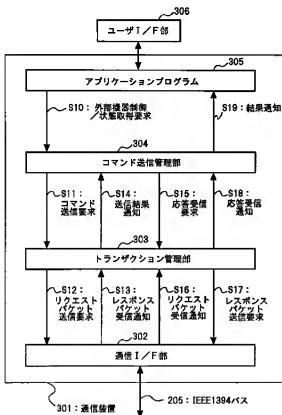
[Drawing 1]



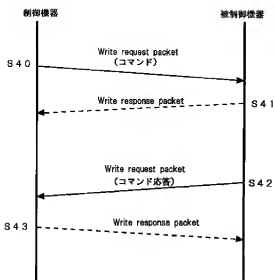
[Drawing 2]



[Drawing 3]



[Drawing 8]



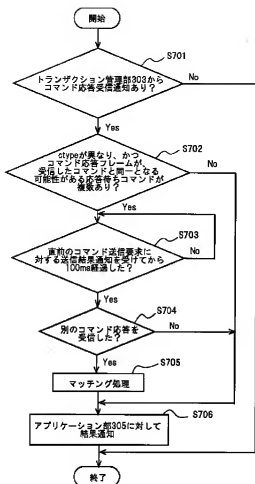
[Drawing 4]

No.	要求アプリケーション	状態	相手先			種別					コマンドコード/パラメータ	
			NodeID	Subunit		ctype	opcode	operand [0]	..	operand [n]		
				type	ID							
1	アプリケーションA	応答待ち	0x01	0x1F	0x03	0x01	0xB2	0x7F				
2	アプリケーションB	送信待ち	...	...	...	...	...	...	..	...		
3	アプリケーションC	送信待ち	...	...	...	...	...	...	..	...		

[Drawing 5]

No.	ctype	opcode	operand[0]	operand[1]	..	operand[n]
1	0x01	0xB2	0x7F			
	0x03	0xB2	0x7F			
2	0x01	0xB2	0x7F			
	0x02	0xB2	0x60			
3	0x01	0xB2	0x7F			
	0x02	0xB2	0x70			
⋮	⋮	⋮	⋮	⋮	⋮	⋮

[Drawing 7]

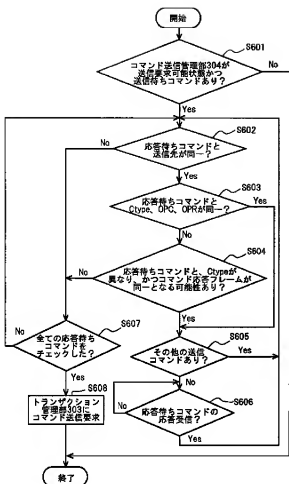


[Drawing 9]

Write request for data quadlet (tcode=0)

DestinationID (Bus/Node)	tlabel	rt	tcode	pri
SourceID (Bus/Node)				
Destination_offset				
Quadlet_data				
Header_CRC				
4 バイト				

[Drawing 6]

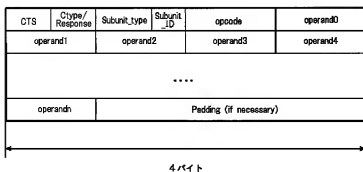


[Drawing 10]

Write request for data block (toode=1)

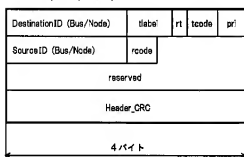
DestinationID (Bus/Node)	label	rt	toode	pri
SourceID (Bus/Node)				
Destination_offset				
Data_length	Extended_toode			
Header_CRC				
Data_field				
----- Padding (if necessary)				
Data_CRC				
4 バイト				

[Drawing 11]



[Drawing 12]

Write response (tcode=2)



[Drawing 13]

Ctype/Response code

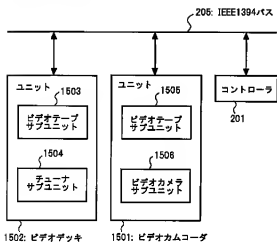
値	Ctype	値	Resp. code
0x00	Control	0x08	Not Implemented
0x01	Status	0x09	Accepted
0x02	Specific Inquiry	0x0A	Rejected
0x03	Notify	0x0B	In Transition
0x04	General Inquiry	0x0C	Implemented/Stable
		0x0D	Changed
		0x0E	Interim

[Drawing 14]

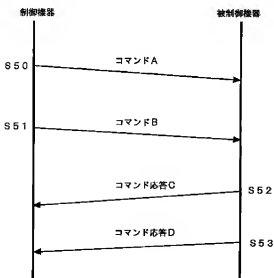
Subunit\_type

値	Subunit Name	値	Subunit Name
0x00	Monitor	0x07	Camera
0x01	Audio	0x09	Panel
0x02	Printer	0x0A	Bulletin Board
0x03	Disc	0x0B	Camera Storage
0x04	Tape Rec/Player	0x1C	Vendor Unique
0x05	Tuner	0x1F	Unit
0x06	CA		

[Drawing 15]



[Drawing 16]





[Drawing 20]

「電源状態問い合わせ」コマンドに対するコマンド応答のパターン

Response	opcode	operand[0]	内容
0x0A	0xB2	0x7F	コマンド拒絶
0x0B	0xB2	0x60	電源ON→OFF状態
0x0B	0xB2	0x70	電源OFF→ON状態
0x0C	0xB2	0x60	電源OFF状態
0x0C	0xB2	0x70	電源ON状態

[Drawing 17]

(a)

コマンドA (電源状態問い合わせ)

NodeID	cotype	Subunit_type	Subunit_ID	opcode	operand[0]
1	0x01	0x1F	0x03	0xB2	0x7F

(b)

コマンドB (電源ONコマンドサポート確認)

NodeID	cotype	Subunit_type	Subunit_ID	opcode	operand[0]
1	0x02	0x1F	0x03	0xB2	0x70

(c)

コマンド応答C

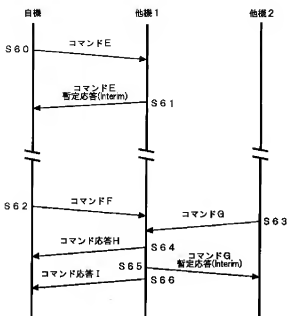
NodeID	response	Subunit_type	Subunit_ID	opcode	operand[0]
1	0x0C	0x1F	0x03	0xB2	0x70

(d)

コマンド応答D

NodeID	response	Subunit_type	Subunit_ID	opcode	operand[0]
1	0x0C	0x1F	0x03	0xB2	0x60

[Drawing 18]



[Drawing 19]

(a)

コマンド E (電源状態変化通知要求)

NodeID	cotype	Subunit_type	Subunit_ID	opcode	operand[0]
1	0x03	0x1F	0x03	0xB2	0x7F

(b)

コマンド F (電源状態問い合わせ)

NodeID	cotype	Subunit_type	Subunit_ID	opcode	operand[0]
1	0x01	0x1F	0x03	0xB2	0x7F

(c)

コマンド応答 H

NodeID	response	Subunit_type	Subunit_ID	opcode	operand[0]
1	0x0A	0x1F	0x03	0xB2	0x7F

(d)

コマンド応答 I

NodeID	response	Subunit_type	Subunit_ID	opcode	operand[0]
1	0x0C	0x1F	0x03	0xB2	0x70

[Drawing 22]

「電源状態変化通知要求」コマンドに対するコマンド応答のパターン

Response	opcode	operand[0]	内容
0x0A	0xB2	0x7F	コマンド拒絶
0x0D	0xB2	0x60	電源OFFに変化
0x0D	0xB2	0x70	電源ONに変化
0x0F	0xB2	0x60	現在は電源OFF状態
0x0F	0xB2	0x70	現在は電源ON状態

[Drawing 21]

「電源ONコマンドのサポート確認」コマンドに対するコマンド応答のパターン

Response	opcode	operand[0]	内容
0x0B	0xB2	0x70	電源ONコマンドをサポートしない
0x0C	0xB2	0x70	電源ONコマンドをサポートする